General

Guideline Title

Diagnosis of obstructive sleep apnea in adults: a clinical practice guideline from the American College of Physicians

Bibliographic Source(s)

Qaseem A, Dallas P, Owens DK, Starkey M, Holty JE, Shekelle P, Clinical Guidelines Committee of the American College of Physicians. Diagnosis of obstructive sleep apnea in adults: a clinical practice guideline from the American College of Physicians. Ann Intern Med. 2014 Aug 5;161(3):210-20. [186 references] PubMed

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

Definitions for the strength of evidence (high, moderate, low, or insufficient evidence to determine net benefits or risks) and strength of recommendations (strong, weak) are defined at the end of the "Major Recommendations" field.

Recommendation 1: *American College of Physicians (ACP) recommends a sleep study for patients with unexplained daytime sleepiness*. (Grade: weak recommendation, low-quality evidence)

Clinicians should target their assessment of obstructive sleep apnea (OSA) to individuals with unexplained daytime sleepiness. This assessment should include evaluation of the risk factors and common presenting symptoms for OSA. The best documented risk factor for OSA is obesity. Clinical symptoms for OSA include unintentional sleep episodes during wakefulness, daytime sleepiness, unrefreshing sleep, fatigue, insomnia, and snoring. If other causes have been ruled out (for example, thyroid disease, gastroesophageal reflux disease, or other respiratory diseases), further evaluation for OSA may be warranted in patients with daytime sleepiness, which is the clinically relevant OSA symptom most responsive to treatment. Evidence is lacking on the effect of continuous positive airway pressure (CPAP) on improving other outcomes, including hypertension, diabetes, coronary heart disease events, and mortality, especially among individuals without daytime sleepiness. For guidance on treatment, clinicians should refer to the ACP guideline on management of OSA. Sleepiness questionnaires, such as the Epworth Sleepiness Scale (ESS), help in assessing the symptom severity of OSA but cannot assess the apnea–hypopnea index (AHI) (a necessary but not sufficient component of OSA) and lack sufficient sensitivity and specificity to replace a sleep study in diagnosing OSA.

Recommendation 2: *ACP recommends polysomnography (PSG) for diagnostic testing in patients suspected of OSA. ACP recommends portable sleep monitors in patients without serious comorbidities as an alternative to PSG when PSG is not available for diagnostic*

testing. (Grade: weak recommendation, moderate-quality evidence)

Full-night, attended, in-laboratory PSG is considered the reference standard diagnostic test and is recommended in patients with suspected OSA. However, in the absence of PSG, portable monitors may be used as an alternative diagnostic test in such patients. Both the American Academy of Sleep Medicine (AASM) and the Centers for Medicare & Medicaid Services consider an AHI score of at least 15 events per hour or at least 5 events per hour with symptoms (such as daytime somnolence and fatigue) as criteria for OSA diagnosis. Evidence shows that compared with PSG, type II, III, and IV monitors have a wide range of difference in AHI estimates. These monitors have a high positive likelihood ratio and low negative likelihood ratio for various AHI cutoff levels to predict OSA. Monitors with more channels perform better than those with fewer channels, and type IV monitors have an important limitation in that they are unable to distinguish obstructive from central sleep apnea. There is no direct evidence from head-to-head comparisons of type III and IV monitors, but indirect evidence from studies comparing each monitor with PSG suggested that type III monitors performed better than type IV monitors in predicting AHI scores suggestive of OSA. Although portable monitors may be useful, data loss of 3% to 20% has been reported for type III and IV monitors. Furthermore, inadequate data resulting in limited interpretation of results from the use of type III monitors has been reported for 13% to 20% of the evaluations. The utility of portable monitors for patients with serious comorbid conditions, including chronic lung disease, congestive heart failure, or neurologic disorders, has not been verified.

Evidence from studies comparing one monitor with another is lacking. The Figure in the original guideline document summarizes the recommendations and clinical considerations.

Definitions:

Grading of Quality of Evidence

High-Quality Evidence: Evidence is considered high quality when it is obtained from 1 or more well-designed and well-executed randomized, controlled trials (RCTs) that yield consistent and directly applicable results. This also means that further research is very unlikely to change confidence in the estimate of effect.

Moderate-Quality Evidence: Evidence is considered moderate quality when it is obtained from RCTs with important limitations—for example, biased assessment of the treatment effect, large loss to follow-up, lack of blinding, unexplained heterogeneity (even if it is generated from rigorous RCTs), indirect evidence originating from similar (but not identical) populations of interest, and RCTs with a very small number of participants or observed events. In addition, evidence from well-designed controlled trials without randomization, well-designed cohort or case-control analytic studies, and multiple time series with or without intervention are in this category. Moderate-quality evidence also means that further research will probably have an important effect on confidence in the estimate of effect and may change the estimate.

Low-Quality Evidence: Evidence obtained from observational studies would typically be rated as low quality because of the risk for bias. Low-quality evidence means that further research is very likely to have an important effect on confidence in the estimate of effect and will probably change the estimate. However, the quality of evidence may be rated as moderate or even high, depending on circumstances under which evidence is obtained from observational studies. Factors that may contribute to upgrading the quality of evidence include a large magnitude of the observed effect, a dose-response association, or the presence of an observed effect when all plausible confounders would decrease the observed effect.

Insufficient Evidence to Determine Net Benefits or Risks: When the evidence is insufficient to determine for or against routinely providing a service, the recommendation was graded as "insufficient evidence to determine net benefits or risks." Evidence may be conflicting, of poor quality, or lacking, and hence the balance of benefits and harms cannot be determined. Any estimate of effect that is very uncertain as evidence is either unavailable or does not permit a conclusion.

The American College of Physicians' Guideline Grading System*		
Quality of Evidence	Strength of Recommendation	
	Benefits Clearly Outweigh Risks and Burden or Risks and Burden Clearly Outweigh Benefits	Benefits Finely Balanced with Risks and Burden
High	Strong	Weak
Moderate	Strong	Weak
Low	Strong	Weak
Insufficient evidence to determine net benefits or risks		

*Adopted from the classification developed by the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) workgroup.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Obstructive sleep apnea (OSA)

Guideline Category

Diagnosis

Evaluation

Screening

Clinical Specialty

Family Practice

Internal Medicine

Nursing

Otolaryngology

Pulmonary Medicine

Sleep Medicine

Intended Users

Advanced Practice Nurses

Nurses

Physician Assistants

Physicians

Respiratory Care Practitioners

Guideline Objective(s)

- To present the evidence and provide clinical recommendations on the diagnosis of obstructive sleep apnea (OSA) in adults
- To address the screening and diagnosis of OSA by presenting a comparison of the effectiveness of the available diagnostic methods

Target Population

Adults with suspected obstructive sleep apnea (OSA)

Interventions and Practices Considered

1. Sleep study
2. Diagnostic testing using in-laboratory polysomnography (PSG) or portable monitors

Major Outcomes Considered

- All-cause mortality
- Cardiovascular mortality
- Nonfatal cardiovascular disease
- Stroke
- Hypertension
- Type 2 diabetes
- Post-surgical outcomes
- Quality of life

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

The literature search for the systematic review was conducted using MEDLINE (1966 to September 2010), the Cochrane Central Register of Controlled Trials, and the Cochrane Database of Systematic Reviews and included peer-reviewed studies published in English. The evidence review was updated through 30 May 2013 by identifying literature in MEDLINE with the same search strategy and inclusion and exclusion criteria as the 2010 report (see the Supplement [see the "Availability of Companion Documents" field]). The included studies reported minimum apnea-hypopnea index (AHI) thresholds for obstructive sleep apnea (OSA) diagnosis ranging from 5 to 20 events per hour. Further details about the methods and inclusion and exclusion criteria applied in the evidence review are available in the Agency for Healthcare Research and Quality (AHRQ) report and the Supplement (see the "Availability of Companion Documents" field).

Inclusion and Exclusion Criteria

Initial search strategy yielded a total of 2,435 articles. Inclusion and exclusion criteria for each AHRQ question were derived from the original AHRQ report. A careful review of titles and abstracts eliminated 1,728 articles. A review of full reports by one investigator (J.C.H.) excluded 622 studies.

Number of Source Documents

85 total reports met inclusion criteria.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Grading of Quality of Evidence

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Moderate-Quality Evidence: Evidence is considered moderate quality when it is obtained from RCTs with important limitations—for example, biased assessment of the treatment effect, large loss to follow-up, lack of blinding, unexplained heterogeneity (even if it is generated from rigorous RCTs), indirect evidence originating from similar (but not identical) populations of interest, and RCTs with a very small number of participants or observed events. In addition, evidence from well-designed controlled trials without randomization, well-designed cohort or case-control analytic studies, and multiple time series with or without intervention are in this category. Moderate-quality evidence also means that further research will probably have an important effect on confidence in the estimate of effect and may change the estimate.

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Insufficient Evidence to Determine Net Benefits or Risks: When the evidence is insufficient to determine for or against routinely providing a service, the recommendation was graded as "insufficient evidence to determine net benefits or risks." Evidence may be conflicting, of poor quality, or lacking, and hence the balance of benefits and harms cannot be determined. Any estimate of effect that is very uncertain as evidence is either unavailable or does not permit a conclusion.

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Study Quality

Methodological criteria for study quality were adapted from those proposed by Kent et al., to identify high-quality studies of the diagnosis for obstructive sleep apnea (OSA) (see Figure 4 in the Supplement) and utilized for Agency for Healthcare Research and Quality (AHRQ) Questions 1 and 2. The revised criteria cover seven assessment categories: technical quality of index test, technical quality of the reference test, application of the reference test, independence of interpretations, clinical description, cohort assembly and sample size.

Data Abstraction

One investigator abstracted primary data regarding patient characteristics and test diagnostics (e.g. sensitivity and/or specificity).

Data Synthesis and Sensitivity/Specificity Calculations

The investigators constructed 2 x 2 contingency tables for each study to summarize the results of the index test and the reference test(s). For each study, the true positive rate (TPR; sensitivity), the false-positive rate (FPR; 1-specificity), the diagnostic odds ratio, positive predictive value, negative predictive value, positive likelihood ratio, negative likelihood ratio, diagnostic accuracy ([TP+TN]/N) and the kappa-1 statistic were calculated. The investigators calculated a weighted kappa-1 coefficient (a generalization of the unweighted or Cohen's kappa coefficient) to assess accuracy with regards to avoiding false negative results. Calculation of the kappa-1 coefficient does not require the false positive rate (1-specificity), but does require knowledge of the marginal probabilities. Weighted kappa coefficient values close to one suggest good test accuracy, while values less than 0.40 suggest only fair to poor test accuracy.

Statistical Models

All biostatistical models were programmed in Excel 8.0 for Windows (Microsoft Corporation, Redmond, Washington, USA). A normal approximation to the binomial of the standard error was used in calculating all other CI's, as appropriate. When making comparisons between

groups of studies we used an unpaired t-test or the Mann-Whitney U test as appropriate. A two-tailed p-value <0.05 was considered statistically significant.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

This guideline is based on the comparative effectiveness review sponsored by the Agency for Healthcare Research and Quality (AHRQ) (see the "Availability of Companion Documents" field), the 2007 Technology Assessment of Home Diagnosis of Obstructive Sleep Apnea-Hypopnea Syndrome, and an updated literature review through May 2013. The recently published American College of Physicians (ACP) guideline on the management of obstructive sleep apnea (OSA) in adults provides guidance on treatment of OSA.

This guideline addresses the following key questions related to the screening and diagnosis of OSA:

1. How do different available tests compare in their ability to diagnose sleep apnea in adults with symptoms suggestive of disordered sleep? How do these tests compare in different subgroups of patients based on race, sex, body mass index, existing type 2 diabetes mellitus, existing cardiovascular disease, existing hypertension, clinical symptoms, previous stroke, or airway characteristics?
2. How does phased testing (screening tests or battery followed by full test) compare with full testing alone?
3. What is the effect of preoperative screening for OSA on surgical outcomes?
4. In adults being screened for OSA, what is the relationship between the apnea–hypopnea index (AHI) and other patient characteristics with respect to long-term clinical and functional outcomes?

Rating Scheme for the Strength of the Recommendations

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Insufficient evidence to determine net benefits or risks		

*Adopted from the classification developed by the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) workgroup.

Cost Analysis

Published cost analyses were reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

This guideline was approved by the American College of Physicians (ACP) Board of Regents on November 17, 2012.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate screening and diagnosis for obstructive sleep apnea (OSA)

Potential Harms

At this point, the American College of Physicians (ACP) Clinical Guidelines Committee cannot determine the benefits and harms of preoperative screening for obstructive sleep apnea (OSA).

Qualifying Statements

Qualifying Statements

- The authors of this article are responsible for its contents, including any clinical or treatment recommendations. No statement in this article should be construed as an official position of the U.S. Department of Veterans Affairs.
- Clinical practice guidelines are "guides" only and may not apply to all patients and clinical situations. Thus, they are not intended to override clinicians' judgment. All American College of Physicians (ACP) clinical practice guidelines are considered automatically withdrawn or invalid 5 years after publication or once an update has been issued.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Mobile Device Resources

Patient Resources

Staff Training/Competency Material

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2014 Aug 5

Guideline Developer(s)

American College of Physicians - Medical Specialty Society

Source(s) of Funding

Financial support for the development of this guideline comes exclusively from the American College of Physicians (ACP) operating budget.

Guideline Committee

Clinical Guidelines Committee of the American College of Physicians

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

Disclosures

Dr. Shekelle reports a grant from the Agency for Healthcare Research and Quality during the conduct of the study; personal fees from ECRI Institute and the U.S. Department of Veterans Affairs outside the submitted work; grants from the Agency for Healthcare Research and Quality, U.S. Department of Veterans Affairs, Centers for Medicare & Medicaid Services, and Office of the National Coordinator outside the submitted work; and a patent with royalties paid to UpToDate. Authors not named here have disclosed no conflicts of interest. Authors followed the policy regarding conflicts of interest described at www.annals.org/article.aspx?articleid=745942. Disclosures can also be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M12-3187. A record of conflicts of interest is kept for each Clinical Guidelines Committee meeting and conference call and can be viewed at www.acponline.org/clinical_information/guidelines/guidelines/conflicts_cgc.htm.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Electronic copies: Available from the Annals of Internal Medicine Web site.

Print copies: Available from the American College of Physicians (ACP), 190 N. Independence Mall West, Philadelphia PA 19106-1572.

Availability of Companion Documents

The following are available:

- Updated Search Strategy (1 October 2010 to 30 May 2013): diagnosis of obstructive sleep apnea in adults: a clinical practice guideline from the American College of Physicians. Supplement. 2014. 109 p. Available from the Annals of Internal Medicine Web site.
- Qaseem A, Snow V, Owens DK, Shekelle P. The development of clinical practice guidelines and guidance statements of the American College of Physicians: summary of methods. Ann Intern Med. 2010 Aug 3;153(3):194-199. Electronic copies: Available from the Annals of Internal Medicine Web site.
- Balk EM, Moorthy D, Obadan NO, Patel K, Ip S, Chung M, Bannuru RR, Kitsios GD, Sen S, Iovin RC, Gaylor JM, D'Ambrosio C, Lau J. Diagnosis and treatment of obstructive sleep apnea in adults. Comparative effectiveness review No. 32. (Prepared by Tufts Evidence-based Practice Center under Contract No. 290-2007-10055-1). AHRQ Publication No. 11-EHC052-EF. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ). 2011 Jul. 494 p. Electronic copies: Available from the Agency for Healthcare Research and Quality (AHRQ) Web site.

Print copies: Available from the American College of Physicians (ACP), 190 N. Independence Mall West, Philadelphia PA 19106-1572.

A collection of Recommendation Summaries for all current American College of Physicians Clinical Guidelines is now available for mobile devices from the ACP Web site.

A continuing medical education (CME) is available from the Annals of Internal Medicine Web site.

Patient Resources

The following is available:

- Summaries for patients. Diagnosis of obstructive sleep apnea in adults: a clinical practice guideline. Ann Intern Med 2014 Aug 5;161(3):1-28. Electronic copies: Available from the Annals of Internal Medicine Web site .

Print copies: Available from the American College of Physicians (ACP), 190 N. Independence Mall West, Philadelphia PA 19106-1572.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC Status

This NGC summary was completed by ECRI Institute on September 19, 2014.

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